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ABSTRACT

In September 1975, the Computer Curriculum Corporation's computer assisted instruction program was instituted at the Scranton State School for the Deaf in Scranton, Pennsylvania. A minicomputer and 20 teletype terminals were installed. Drill and practice programs in elementary level math, reading and language arts were initiated. Teachers' reactions to the first year's experience were enthusiastic. Specific complaints were aimed at the level and limitations of the curriculum. Everyone agreed that the system was appropriate for the school population. The total cost of the system projected for five years was estimated at $180,000. Based on the first year's average of 1.7 hours of use per student per week, the average cost per student hour was $3.80. In the first year middle school students averaged a 1.3 grade level gain in math and a .4 gain in reading. High school students showed a 1.1 grade level gain in math and 1.3 in reading. The dramatic story of one student's gains using the system added to the positive evaluation of the program. (KB)

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CAI IN A SCHOOL FOR THE DEAF:

EXPEDED RESULTS AND A SERENDIPITY OR TWO

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Superintendent

The purpose of this paper is to share with you some of the reactions we have been getting from our teachers following installation of Computer Curriculum Corporation's CAI in September. For those of you who are not familiar with CCC's program, it is an outgrowth of work done at the Stanford Research Institute under funding from the U. S. Office of Education in the mid-1960's. Drill and practice programs are being used in the areas of mathematics, reading, and language arts at the elementary grade levels.

The mini-computer has a 32K core memory with a capability of handling thirty terminals simultaneously. Our school purchased twenty teletype terminals, more than sufficient to meet the needs of our 140 students old enough to utilize the system.

The thirty-five members of our teaching staff participated in a two-day in-service workshop with representatives of the vendor prior to the school's opening. Prior to that time only one member of the staff, the educational director, had had any experience with CAI. A houseparent was re-assigned to supervise the CAI lab.

The teaching staff was initially overwhelmed by the capabilities of the system, but following the very able assistance from the vendors, this initial reaction was replaced with positive anticipation.

School began in September and at the end of that month I conducted the first of three evaluations with the teaching staff. The first evaluation was in the form of an open-ended question to the staff. Responses were received from half of the teachers who were utilizing the system. Rather than to summarize their remarks, let me quote from two of them:

> I saw a student miss a question dealing with <u>years.</u> When a similar question dealing with <u>months</u> came up, the 'light' in his eyes showed that he knew what was expected. The students love CAI and I do too. Motivation is high and I'm hoping the initial enthusiasm will be maintained.

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> The children were fascinated by the computer and worked with it until it was time to leave; then there echoed "Aw...'s" all around. Now every day the children ask when they will be able to use it again. Even our students with low boredom thresholds worked on it relentlessly. What else can I say? These kids are the toughest jury in the world and they just seem to love it!

In January a second follow-up was done getting the teachers' reactions to CAI after a four month experience. This follow-up was an informal question and answer session with teachers whose children use the system frequently. The same kinds of positive comments were re-echoed. At this time, however, the teachers were in a better position to analyze CAI's shortcomings. Not one negative comment was received regarding the general principle of CAI, with the exception of several individuals who wondered how long the student's interest level would be maintained.

The specific negative comments on the CCC curriculum will be discussed with the vendor and hopefully some of these can be resolved through minor changes in programming. For example, several teachers of multiply-handicapped students suggested that it would be helpful if a longer interval could be provided for their students before the machine times them out. At least 15% of our students have physical handicaps in addition to deafness, and for these individuals the 60 second interval is just too short.

Another comment had to do with the relative lack of measuring comprehension in the reading curriculum. The teachers were asking: Can a program be developed where the student is given a paragraph and then asked questions that measure the comprehension of that paragraph?

The teachers have also asked whether or not it would be possible to reduce the grade level for entry into the system. Additionally, there is some feeling that t he vocabulary level is too diverse for deaf students.

Again, I want to emphasize, none of the teacher comments questioned CAI as an educational strategy; there seemed to be universal agreement as to its validity for our student body.

A third teacher survey was done in June of this year at which time the staff was again asked to describe their reactions to CAI at the school. The teachers' enthusiastic responses can be summed up best by quoting specifically from one instructor. This mathematics teacher said:

> CAI is perhaps the best educational investment that this school has ever made. I have observed such traumatic gains in the students' achievement levels that I have no doubt about its effectiveness. There has not yet been any perceptible decrease in the students; enthusiasm when working with the computer. CAI will become very instrumental in improving the quality of education at PSOSD in the future.

As an administrator, teacher reactions to CAI were and are valuable to me. It is also necessary for me to evaluate this form of instruction from a purely pragmatic, fiscal, point of view. Doing such resulted in the following findings:

> The computer has been operational at this school for 175 days, six hours per day. With 20 terminals, that totals a possible 21,000 hours of drill and practice instruction for our student body. Records are kept on each student's work with the computer and during this first year of use, we estimate that 8,610 hours have been spent by the students actually working with CAI. In terms of percentages, the computer was working for us at 41% capacity during this first year of operation.
>
> Assuming that this 41% capacity figure will remain constant, and assuming that the system will have a life span of five years, what is the cost per student-hour of CAI?
>
> The system's initial cost was $133,000. Added to this cost is the salary of a teacher aide full time for five years, the teletype maintenance, paper and ribbons involved in the operation of the program. The total cost for the five year period comes to approximately $180,000. Based on the present usage which is averaging 1.7 hours per student/week, it is estimated that in the course of five years a total of 47,000 hours will be spent in CAI. The resulting cost/hour approximates $3.80.
>
> From strictly a cost point of view, CAI represents an economical means of instruction. (Teacher aide salaries in the state are currently $5.08hour). The dollars involved, however, are only a small portion of the total equation. It would not be possible to hire human services which would be as organized, consistent, and non-emotional as is CAI.

Students' achievement gains during the past year were gratifying. The 10-12 year old middle school students achieved an average 1.3 grade level gain in mathematics during the past year. These same students realized only a .4 grade level gain in reading, however. High school age students showed a 1.1 grade level gain in mathematics and a 1.3 average grade level gain in reading.

About half-way through the school year I was approached by two of our high school seniors who indicated that they wanted to spend more time on t he computer and asked whether or not it would be possible to have the computer room open an extra hour after school. An announcement was made to all of our high school students indicating that the computer would be usable from 3 to 4 each day but the only students who demonstrated an interest in doing this extra work were those seniors who were trying to build up their skills prior to taking the necessary tests for acceptance to the National Technical Institute for the Deaf. On figures 1 and 2 I have shown these three students

(who incidentally were accepted to NTID) in comparison with the average for the entire Upper School. I think it would be difficult to find a more graphic illustration of the factor that motivation plays in academic achievement than this.

We have data at the school from previous years showing the achievement gains made by standard teaching methodologies without CAI and we're working at the present time to interpellate the gains that could have been expected without the introduction of CAI. This interpellation, as compared with the actual achievement gains we feel may demonstrate the value of CAI in another way. These data should be ready for publication in September.

A secondary benefit was gained from CAI; a serendipity which I would not have predicted in August. Illustrative of this serendipity is a student by the name of Hope_____, who came to our school two years ago at the age of 17. Prior to that time she had bounced around special education classes with limited academic success. Hope's problems are many: communication is limited, there are significant social problems, and there is some neurological involvement, which manifests itself in reduced physical mobility. Added to all of her other problems, Hope also possessed some bizarre behavior characteristics. The staff noticed that sudden changes in the weather would trigger aggressive, almost violent behaviors in the girl.

Hope was placed in our Upper School 'specials' class where the teacher began keeping an anecdotal record of Hope's activities. Among the numerous observations of the teacher was the finding that Hope seemed to lack an ability to remember spatial relationships within her environment. Each day when she came into the room, it appeared that she did not remember where her desk was located. Every time she was excused to go to the girls' room she left her room and couldn't remember which direction to go.

Juxtaposed against these serious handicaps were some bright spots. Hope seemed to be able to read--far beyond what might have been expected. Hope seemed to have a special interest in reading about emotionally disturbed people, and in spite of limited communication abilities, it appeared as though she understood much of what she r ead.

Early in October Hope's teacher decided to try three of her students on the CAI program. One week after Hope betan CAI the t eacher wrote, "Hope enjoys the machine tremendously. She follows directions very well on it. It is an excellent, non-emotional way for her to learn and drill. She has only used the low levels of math to day. As she gains, the langauge and reading will be added to her time of the machine."

In less than three months on CAI, Hope went from the entry point in mathematics to the sixth and seventh grade levels in the various strands. By February she was out of the CAI mathematics curriculum.

The important point is this: had it not been for our recently installed CAI, we might never have realized Hope's potential. Because of her age, we had previously decided that this would be her last year at the school: with what we now know, we have scheduled her for another year at the school.

The purpose of this paper was to present some of our preliminary reactions to the introduction of CAI in a residential school for the deaf. In summary, it is the feeling of the teaching staff that CAI can play an important part in the education of deaf students. The enthusiasm of the teaching staff toward the utilization of CAI is extremely high. Student enthusiasm and motivation are also high; and there is evidence that achievement gains can be credited, in part, to CAI.

In terms of cost effectiveness, it appears that CAI is a reasonable way to instruct students. When the equation is supplemented by a serendipity such as in the case of Hope, CAI becomes all the more valuable.

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